Mercury by Anonymous

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Home › Mercury by Anonymous

MERCURY.

NOTHING more resembles tin or lead in their state of fusion, than Mercury in its natural state; also it has been regarded as a fluid metal to which one has sought, but in vain, the means of giving solidity; we have only found that extreme cold could coagulate it, without giving it a constant solidity, or even nearly as permanent as that of icy water; & by this unique & singular relationship, mercury seems to approach the nature of water, as much as it approaches metal by other properties, & in particular by its density, the greatest of all after that of gold (a); but it differs from any metal, and even from any metallic mineral, in that it has no tenacity, no hardness, no solidity, no fixity,& it still approaches water by its volatility, since, like it, it volatilizes & evaporates at moderate heat. Is this mineral liquid therefore a metal! or is there not a water which resembles metals because it is charged with the densest parts of the earth, with which it is more intimately united than in any other matter!

It is said that in general, all fluidity comes from heat, & that in particular fire acts on metals like water on salts, since it liquefies them, & that it would hold them in a constant fluidity. it was always at the same degree of violent heat, while the salts require only that of the present temperature to remain liquid; all salts liquefying in water like metals in fire, the fluidity of mercury is, it seems to me, more to the first

Ancient Texts

element than to the last;for mercury only solidified by freezing like water; it even needs a much greater degree of cold, because it is much denser; fire is here in an almost infinitely small quantity, whereas this same element cannot act on metals, as a liquefier, as a solvent, only when applied to them in infinitely large quantities; in comparison to what is needed mercury can remain liquid.

Moreover, mercury is reduced to vapors by the effect of heat, more or less like water, and these two sappers are equally incoercible, even by the strongest resistances; both burst or split the strongest vessels with explosion; finally, mercury wets metals, as water wets salts or earths, in proportion to the salts they contain;Can't mercury then be considered as a dense & heavy water, which only holds to metals by this ratio of density! & this water denser than all known liquids, must it not have formed, after the fall of other waters & equally volatile matters relegated to the atmosphere, during the incandescence of the Globe! metallic, terrestrial, aqueous & saline parts, then sublimated or reduced to vapours, will have combined, & while the fixed materials of the Globe vitrified or were deposited in the form of metal or metallic lime, while the water still penetrated with fire produced the acids & the salts, the vapors of these metallic substances, combined with those of water and acidic principles, could they not form this substance of mercury almost as volatile as water, and dense as metal!This liquid substance which freezes like water and which differs essentially only in its density, must not have been found in the order of combinations of Nature, which has produced not only metals & half metals, but also metallic & saline earths, such as arsenic! Gold, to complete the rest of its operations, did it not also have to produce metallic waters such as mercury! The scale of Nature, in its metallic productions, begins with gold which is the most unalterable metal, and consequently the most perfect; then silver, which being subject to some alterations, is less perfect than gold; after which copper, tin and lead, which are susceptible not only to alteration, but to decomposition, are imperfect metals in comparison with the first two;finally, iron forms the nuance between imperfect metals and half-metals; because iron and zinc do not present any essential character, which must really place them in two different classes; the ductibility of iron is a property that Art gives it, it burns like zinc; it only needs a stronger fire, &c. we could therefore equally take iron for the first of the semi-metals, or zinc for the last of the metals; & this scale continues with antimony, bismuth, & ends with the metallic earths & with mercury, which is only a liquid metallic substance.

We will familiarize ourselves with the idea of this possibility, by weighing the considerations that we have just presented, and by remembering that water, in its essence, must be regarded as an insipid and fluid salt, than ice which does not is that this same salt made solid, becomes all the more so, as the cold is greater; that water, in its liquid state, can acquire density & include that it dissolves salts; that water purged of air is incompressible, and therefore composed of very solid and very hard parts; that consequently it would become very dense if these same parts united more closely; & although we do not know exactly the means that Nature has employed to bring about this bringing together of the parts in mercury,we nevertheless see enough of it to be justified in presuming that this fluid mineral is rather a metallic water than a true metal; in the same way as arsenic, to which we give the name of half-metal, is only a rather saline earth than metallic, and not a true half-metal. You may reproach me for abusing terms here, by saying that mercury wets metals, since it does not wet other materials; whereas water and other liquids wet all the substances offered to them, and consequently they alone have the ability to wet;but by paying attention to the great density of mercury, and to its strong attraction which units its constitute parts together, one will easily feel that a water, whose parts would attract each other as strongly as those of mercury, would not wet more than mercury , the parts of which can only disunite it by heat, or by a power stronger than that of their reciprocal attraction, and which therefore these same parts can only wet gold, silver, and other substances who the attract more powerfully than they attract each other ;one will feel in the same way that if water seems to wet all materials indiscriminately, it is because its integral parts having only a weak adherence between them, any contact sufficient to separate them, and the more the foreign attraction will surpass the reciprocal & mutual attraction of these constitute parts of water, plus foreign matters, will attract it powerfully & will wet deeply. Mercury, by its very great fluidity, would wet and penetrate all the solid bodies of Nature, if the force of attraction which is exercised between its parts in proportion to their density, did not hold them, so to speak, in mass, & consequently did not prevent them from separating & spreading out into molecules small enough to be able to enter the pores of solid substances;the only difference between mercury & water, in the action of wetting, therefore comes only from the more or less coherence in the aggregation of their constituent parts, & consists only in that those of water separate from each other much more easily than those of mercury .

Thus this fluid mineral like water, freezing like it by cold, reducing itself like it to vapors by heat, wetting metals as it wets salts & earths, even penetrating the substance of oils & seeds, & entering with them into the body of animals, as water enters vegetables, has moreover a relation with it which presupposes something common in their essence; it is to spread like water, a vapor which one can regard as humid;it is by this vapor that the mercury whitens & penetrates the gold without touching it, as the humidity of water spread in the air penetrates the salts, everything therefore contributes, it seems to me, to prove that mercury. is not a real metal, nor even a half-metal; but a water loaded with the densest parts of the earth; as half-metals are only charged earths, so are other dense and heavy parts, which bring them closer to the nature of metals. After having exposed the relations which mercury can have with water, we must also present those which it really has with metals; it has the density, the opacity, the metallic luster, it can likewise be dissolved by acids, precipitated by the alkalis;like them, it contracts no union with earthy materials, and like them again, it contracts with other metals; & if one wants it to be a metal, one could even regard it as a third perfect metal, since it is almost as unalterable as gold & silver, by the impressions of the humid elements. These relative and common properties therefore bring it even closer to the nature of metal than they distance it from that of water, and I cannot blame the alchemists, who,seeing all these properties in a liquid, have regarded it as the water of metals, and particularly as the basis of gold and silver, to which it approaches by its density, and to which it units with an eagerness which holds magnetism, and again because it has, like gold and silver, neither smell nor taste: finally, we are not yet quite sure that this dense liquid does not enter as a principle in the composition of metals, & that it cannot be extracted from any metallic mineral. Let us therefore seek, without prejudice, what can be the essence of this amphibious mineral, which partakes of the nature of metal and of that of water; let us gather the main facts that Nature presents to us, But these facts seem at first innumerable;no matter has been more tried, more manipulated, more combined; the Alchemists especially, persuaded that mercury or the mercurial earth was the base of the metals, & seeing that it had the greatest affinity with gold & silver, have done immense work to try to fix it, to convert, to extract it; they sought it not only in metals & minerals, but in all substances & even in plants; they wanted to ennoble, by its means, imperfect metals, and although they almost always missed the goal of their research, they did not fail to make several interesting discoveries. Their main object was not absolutely chimerical, but perhaps morally unattainable;for nothing opposes the idea of the transmutation or the ennoblement of metals, except the little power of our Art, in comparison with the forces of Nature, & since it can convert the elements. could it not, could it not yet transmute metallic substances! The Chemists believed, for the honor of the name, to have to reject all the ideas of the Alchemists; they even disdained to study and follow their methods; they have however adopted their language, their characters, and even some of the obscurities of their principles; the phlogiston, if it is not the fixed fire animated by the air; the mineralizer, if it is not yet the fire contained in the pyrites & in the acids, seem to me as precarious as the mercurial earth and the water of the metals;we believe we should equally reject everything that does not exist as everything that cannot be understood, that is to say, everything of which we cannot have a clear idea; we will therefore try, in writing the history of mercury, to remove its fables as much as its chimeras.

Considering first the mercury such as Nature offers it to us, we see that it is only found in the strata of the earth formed by the deposition of the waters; that it does not occupy, like the metals, the perpendicular fissures of the rock of the globe, that it does not lie in the quartz, & is never even accompanied by it, that it is not mixed in the ores other metals;that its mine, to which we give the name of cinnabar, is not a true ore, but a compound, by simple juxtaposition, of sulfur and mercury united, which is found only in mountains with layers, and never in primitive mountains; that consequently the formation of these mines of mercury, is posterior to that of the primordial mines of metals, since it supposes the sulfur already formed by the decomposition of the pyrites; we will see moreover that it is only very rarely that mercury occurs in a flowing state, and that although it has less affinity than most metals with sulfur, it has nevertheless incorporated only with stones or soils that are overloaded with them;that it is never so intimately united with them as not to be easily separated from them, that it even entered these sulphurous lands only by a sort of imbibition, as water enters other lands, and that it must have penetrated every time it found itself reduced to vapours; that finally it is only found in a few particular places, where the sulfur itself was found in large quantities, & reduced to liver of sulfur by alkalis or calcareous earths, which gave it the affinity necessary for its union with mercury: it is indeed found , in significant quantity, only in these places alone; everywhere else, it is only disseminated in particles so tenuous that they cannot be collected, or even seen, except in a few particular circumstances. All this can be demonstrated by carefully comparing observations and facts, and we are going to give the proofs in the same order as we have just presented these assertions.

In three large mercury mines, and each of which alone would suffice for the water needs of the whole Universe, two are in Europe and one in America; all three are in the solid form of cinnabar: the first of these mines is that of Idria in Carniola (b); it is in a black slate surmounted by limestone rocks; the second is that of Almaden in Spain ©, whose veins are in sandstone beds (d): the third is that of Guanca-velica, a small town sixty leagues from Pisco in Peru (e). The veins of cinnabar are there either in a hardened and whitish clay, or in hard stone.Thus these three mercury mines also lie in slates or sandstones, that is to say, in layered hills or mountains, formed by the deposition of waters, & all three are so abundant in cinnabar that it seems that all the mercury of the Globe is accumulated there (f); for the small mines of this mineral which have been discovered in a few other places cannot be compared to them either for the extent or for the quantity of the material, and we will mention them here only to demonstrate that they are all found in deposited layers by the waters of the sea, and never in the mountains of quartz or glassy rocks, which were formed by the primitive fire.

In France, we recognized in 1739, two leagues from Bourbonne-lesbains, two species of earth which gave up a three hundredth part of their weight in mercury, they lay fifteen or sixteen feet deep on a layer of clay (g). Five leagues from Bordeaux near Langon, there is a fountain at the bottom of which one often finds flowing mercury (h); in Normandy, in the village of La Chapelle, election of Saint-Lo, there has been some work begun to exploit a mercury mine, but the product was not equivalent to the expense, and this mine was abandoned (i): finally in some places of Languedoc, particularly in Montpellier, one saw mercury in the clay at small depths, & even on the surface of the ground (k). In Germany, there are several mercury mines in the lands of the Palatinate and the duchy of Deux-Ponts (1); & in Hungary, the cinnabar mines, as well as those of Almaden in Spain, are often accompanied by rusting iron mines, & sometimes the iron, the mercury & the sulfur are so mixed there that they form only one same body (m).

This mine of Almaden so rich that it caused all the other mines of mercury in Spain to be neglected; however, some have been recognized near Alicante & Valencia (n); a mine of this mineral has also been worked in Italy, six miles from the Valle imperina near Feltrino, but this mine is now abandoned (o); we also see signs of mercury mines in some places in Poland (p).

In Asia, Travelers only mention mines, mercury in China (q) & the Philippines (r), & they do not say that there is a single one in Africa; but in America, besides the great and rich mine of Guanca-velica in Peru, we know of a few others; one has even been exploited near Azoque, in the province of Quito (f). The Peruvians had worked for a long time in the cinnabar mines, without knowing what mercury was; they only knew the mine from which they made vermilion to paint their bodies or make pictures; they had done a lot of work at Guanca-velica in this single view (t), & it was not until 1564 that the Spaniards began to work cinnabar to extract mercury (u). We see from the testimony of Pliny,that the Romans also made a great deal of vermilion, and that they drew from Spain, each year, about ten thousand pounds of cinnabar as it comes out of the mine, and that they then prepared it in Rome. Theophrastus, who lived four hundred years before Pliny, mentions cinnabar from Spain; these historical features seem to prove that the mines of Idria, much closer to Rome than those of Spain, were not yet known; & in fact, Spain was civilized & commercial, while Germany was still uncultivated. mentions cinnabar from Spain; these historical features seem to prove that the mines of Idria, much closer to Rome than those of Spain, were not yet known; & in fact, Spain was civilized & commercial, while Germany was still uncultivated.mentions cinnabar from Spain; these historical features seem to prove that the mines of Idria, much closer to Rome than those of Spain, were not yet known; & in fact, Spain was civilized & commercial, while Germany was still uncultivated.

One sees by this enumeration of the mines of mercury, of the different parts of the world that all lie in the layers of the earth stirred up and deposited by the waters, and that none is found in the mountains produced by the primitive fire, nor in the fissures of quartz; we see in the same way that we do not find cinnabar mixed with mines of other metals (x), with the exception of those of iron in rust, which, as we know, are of the latest formation.The establishment of the primordial mines of gold, silver, and copper in the quartz rock, is therefore much earlier than that of the mercury mines, and therefore should we not conclude that these metals molten or sublimated by primitive fire, could not grasp or assimilate a matter which, by its volatility, was then like water, relegated to the atmosphere! that consequently, it is not possible that these metals contain only one atom of this volatile matter, and that consequently one must give up the idea to draw from them the mercury or the mercurial principle which cannot be there! This idea of mercury, principle existing in gold & silver, was founded on the great affinity & the very strong attraction, which is exerted between mercury & these metals;but we must consider that any attraction, any penetration that takes place between a solid & a liquid, is generally proportional to the density of the two materials, & that that of mercury being very large & its molecules infinitely small, it can easily penetrate the pores of these metals, and moisten them as water moistens the earth. that consequently, it is not possible that these metals contain only one atom of this volatile matter, and that consequently one must give up the idea to draw from them the mercury or the mercurial principle which cannot be there! This idea of mercury, principle existing in gold & silver, was founded on the great affinity & the very strong attraction, which is exerted between mercury & these metals;but we must consider that any attraction, any penetration that takes place between a solid & a liquid, is generally proportional to the density of the two materials, & that that of mercury being very large & its molecules infinitely small, it can easily penetrate the pores of these metals, and moisten them as water moistens the earth. that consequently, it is not possible that these metals contain only one atom of this volatile matter, and that consequently one must give up the idea to draw from them the mercury or the mercurial principle which cannot be there! This idea of mercury, principle existing in gold & silver, was founded on the great affinity & the very strong attraction, which is exerted between mercury & these metals;but we must consider that any attraction, any penetration that takes place between a solid & a liquid, is generally proportional to the density of the two materials, & that that of mercury being very large & its molecules infinitely small, it can easily penetrate the pores of these metals, and moisten them as water moistens the earth. it is not possible that these metals contain a single atom of this volatile matter, and that consequently we must renounce the idea of drawing from them the mercury or the mercurial principle which cannot be found there! This idea of mercury, principle existing in gold &

silver, was founded on the great affinity & the very strong attraction, which is exerted between mercury & these metals;but we must consider that any attraction, any penetration that takes place between a solid & a liquid, is generally proportional to the density of the two materials, & that that of mercury being very large & its molecules infinitely small, it can easily penetrate the pores of these metals, and moisten them as water moistens the earth. it is not possible that these metals contain a single atom of this volatile matter, and that consequently we must renounce the idea of drawing from them the mercury or the mercurial principle which cannot be found there! 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But let's follow my assertions: I said that cinnabar was not a real mineral, but a simple compound of mercury seized by the liver of sulfur, & this seems to me demonstrated by the composition of artificial cinnabar made by the wet process; it is only necessary to compare it with the mercury mine to be convinced of their identity as a substance. Natural cinnabar in bulk is a very dark red;it is composed of shiny needles applied longitudinally one on top of the other, which alone suffices to demonstrate the real presence of sulfur: it is made in Holland of just the same & in large quantities; we do not know how to manipulate it, but our chemists have almost guessed it, they make artificial cinnabar by means of fire, by mixing mercury with molten sulfur (y), & they also make it by the wet process, by combining mercury with liver of sulfur (z); this last process appears to be that of Nature;the liver of sulfur being only the sulfur itself combined with the alkaline matters, that is to say with all the terrestrial matters, with the exception of those which have been produced by the primitive fire, one can conceive easily than in places where liver of sulfur and mercury will be found together, as in clays, sandstones; calcareous stones, loamy soils & other materials formed by the deposition of water, the combination of mercury, sulfur & alkali will have been made, & cinnabar will have been produced. It is not that Nature could not also have formed cinnabar in certain circumstances by the fire of volcanoes;but by comparing the two processes by which we have been able to imitate it in this production of cinnabar, we see that that of sublimation by fire requires a much greater number of combinations than that of the simple union of the liver of sulfur. with mercury, by the wet process.

Mercury has by itself no affinity with earthy materials, and the union which it contracts with them by means of the liver of sulphur, although permanent, is not intimate; for it is easily removed from the hardest masses of cinnabar by exposing them to fire (a). It is therefore only by particular accidents, and in particular by the action of subterranean fires, that mercury can separate it from its mine, and it is for this reason that it is so rarely found in its flowing state.It therefore only entered into earthy materials by imbibition like any other liquid, and it united with them by means of the combination of their alkalis with sulphur; & this imbibition or moistening seems well demonstrated, since it suffices to heat the cinnabar to dry it out (b), Mercury has much less affinity than most metals with sulphur, and it usually only units with it through the intermediary of alkaline earths; it is for this reason that it is not found in any pyritic mine or in the ores of any metal, any more than in quartz and other vitreous materials produced by primitive fire; for neither alkalis nor sulfur existed at the time of the formation of vitreous matter;& although the pyrites, being of a posterior formation, already contain the principles of sulfur, that is to say, the acid & the substance of fire, this sulfur was neither developed nor formed, & could not by therefore unite with alkali, which itself was only produced after the formation of pyrites, Finally, although we have seen by the enumeration that we have made of all the known mines, that mercury is only found in large quantities in a few particular places, where the fully formed sulfur is found united with the alkaline earths, it should not be concluded, however, that these places alone contain all the existing quantity of mercury; one can, and even one must believe on the contrary that there are many of them on the surface and in the first layers of the earth;but, that this fluid mineral being by its nature susceptible of an almost infinite division, it was disseminated in molecules so tenuous that they escape our eyes, and even all the researches of our Art, unless by chance, as in the examples we have cited , these molecules are not found in sufficient number to be able to collect them or unite them by sublimation. Some Authors have advanced that flowing mercury was drawn from the roots of a certain doronic-like plant ©; that in China wild purslane was made from it (d); I do not want to guarantee these facts;but it does not seem to me impossible that the mercury, disseminated in very small molecules, is pumped up with the sap by the plants, since we know that they pump up the particles of iron contained in the vegetable earth. roots of some doronic-like plant ©; that in China wild purslane was made from it (d); I do not want to guarantee these facts; but it does not seem to me impossible that the mercury, disseminated in very small molecules, is pumped up with the sap by the plants, since we know that they pump up the particles of iron contained in the vegetable earth. roots of some doronic-like plant ©; that in China wild purslane was made from it (d); I do not want to guarantee these facts;but it does not seem to me impossible that the mercury, disseminated in very small molecules, is pumped up with the sap by the plants, since we know that they pump up the particles of iron contained in the vegetable earth.

By subjecting the cinnabar to the action of fire in closed vessels, it will sublimate without changing its nature, that is to say, without decomposing; but by exposing it to the same degree of fire in open vessels, the sulfur of the cinnabar burns, the mercury volatilizes and is lost in the air; we are therefore obliged to retain it, to sublimate it in closed vessels, & in order to separate it from the sulfur which sublimates at the same time, we mix with the cinnabar reduced to powder iron filings (e);this metal having much more affinity than mercury with sulfur, seizes it as the fire releases it, & by this interlude, the mercury rises alone in vapors which it is easy to collect in small drops runny, in a container half full of water. When one only wants to be sure whether an earth contains mercury or does not contain any, it suffices to mix the powder of this earth with iron filings on a brick, which is covered with a glass vase, & to put fire under this brick; if the earth contains mercury, it will be seen to rise in vapors which will condense at the top of the vessel into small drops of flowing mercury. After having considered mercury in its mine, where it forms part of the solid of the mass, we must now examine it in its fluid state: it has the metallic brilliance, perhaps more than any other metal, the same color, or rather the same white as silver; its density is between that of lead & that of gold; it loses only one fourteenth of its weight in water, the cubic foot of which is supposed to weigh seventy-two pounds, and consequently the cubic foot of mercury weighs one thousand and eight pounds. The humid elements make no perceptible impression on the mercury; its very surface is dulled in the air only by the dust which covers it, & that it is easy to separate by a simple & light rubbing;it seems to be charged in the same way with the humidity diffused in the air; but on wiping it off its surface regains its former brilliance.

The name of virgin mercury has been given to that which is the purest & the most flowing & which is sometimes found in the bosom of the earth, after having flowed out of the mine by the only commotion, or by a simple movement. of agitation, without the aid of fire; that obtained by sublimation is less pure; & one will be able to recognize its great purity by a very remarkable effect; it is that by shaking it in a glass tube, its friction then produces a sensitive light, & similar to the electric flash; electricity is indeed the cause of this luminous appearance.

Mercury spilled on the polished surface of any material with which it has no affinity, forms, like all other liquids, small globular drops by the sheer force of the mutual attraction of its parts; the drops of mercury are formed not only with more rapidity, but in smaller masses, because being twelve or fifteen times denser than the other liquids, its force of attraction is much greater & produces more apparent effects.

It does not appear that a moderate heat, although applied for a very long time, changes anything in the state of flowing mercury (f); but when it is given a degree of heat much greater than that of boiling water, the reciprocal attraction of its parts is no longer strong enough to hold them together;they separate and vanish, without however changing their essence or even altering. They are only divided & launched by the force of heat; they can be collected by arresting this effect by condensation, and they are then represented in the same form, and such as they were before.

Although the surface of mercury is charged with the dust of the air, and even with the vapors of water, which float in the atmosphere, it has no affinity with water, and it does not take any with the air than by the calcination fire: the air then attaches itself to its surface & settles between its pores, without uniting very intimately with it, & even without becoming corrupted or altered;which seems to prove that there is little or no fixed fire in mercury, and that it cannot receive it because of the humidity which is part of its substance, and even one cannot attach the air to it only by means of a strong enough fire and sustained for several months; mercury, by this very long digestion in vessels which are not exactly closed, gradually takes the form of a kind of lime (g), which nevertheless is different from Metallic limes; because although it has the appearance, it is nevertheless only mercury charged with pure air, & it differs from other metallic limes, in that it revitalizes itself, & without the addition of no flammable or other material which has more affinity with air than it has with mercury;it suffices to put this so-called lime in a well-backed vessel, and to heat it to a violent fire, so that, in volatilizing, the mercury leaves the air with which it was united only by the force of a long constraint. , & without intimacy, since the air which one had withdrawn is pure, & has contracted none of the qualities of mercury; that besides by weighing this lime, we see that it returns by its reduction the same quantity, that is to say, as much air as it had seized; but when the other metallic limes are reduced, it is the air that is carried away by offering it flammable materials, whereas in these it is the mercury which is carried away & separated from the air by its only volatility (h).

This union of the air with the mercury is therefore only superficial, and although that of the sulfur with the mercury in the cinnabar is not very intimate, however it is much stronger and deeper; because by putting the cinnabar in closed vessels like the lime of mercury, the cinnabar does not decompose, it sublimates without changing its nature, and without the mercury separating, whereas by the same process, its lime decomposes it & mercury leaves the air.

The liver of sulfur appears to be the matter with which the mercury has the greatest tendency to unite, since in the bosom of the earth the mercury appears only in the form of cinnabar; sulfur alone, and without mixture of alkaline matters, does not act so powerfully on mercury;it mixes with it more or less like seeds when they are triturated together, and this mixture where the mercury disappears, is only a heavy black powder to which chemists have given the name of mineral ethiops (i); but despite this change of color, & despite the appearance of a rather intimate union between mercury & sulfur in this mixture, it is still true that it is only a union of contact & very superficial; because it is easy to withdraw without loss, For the rest, when mercury, by means of fire & by the addition of air, takes the form of a powdered lime or earth, this powder is at first black, & then becomes a beautiful red en, continuing fire; it even sometimes presents small transparent crystals of a ruby red.

As the density of mercury is very great, and at the same time its constituent parts are almost infinitely small, it can be applied better than any other liquid to the surfaces of all polished bodies. The force of its union by simple contact with a mirror glass, was measured by one of our most learned Physicists (k), & was found to be much stronger than one could imagine. This experiment proves again, as I said, with the article of the tin, that there is between the sheet of tin and the ice, a layer of pure mercury, lively and without mixture of any part. of tin, and that this layer of flowing mercury adheres to the ice only by simple contact. Mercury therefore does not unite with glass any more than with any other earthy matter;but it amalgamates with most metallic substances: this union by amalgam is a moistening which is often done cold and without producing heat or effervescence, as happens in solutions; it is an average operation between the alloy & the dissolution; because the first supposes that the two materials are liquefied by the fire, and the second is only done by the fusion or the calcination of the metal by the fire contained in the solvent, which always produces heat; but in the amalgams, there is only wetting & point of fusion nor of dissolution: & even one of our most skilful Chemists (1), It may be objected that cold is produced during the union of mineral alkali with nitrous acid, of sal ammonia with water, of snow with water, and that all these unions are indeed real dissolutions;but that itself proves that cold is only produced when dissolution begins with wetting; for the true cause of this cold is the evaporation of the heat of the water, or of the liquors in general which cannot wet without partly evaporating.

Gold amalgamates with mercury by simple contact, it receives it on its surface, retains it in its pores, and can only be separated from it by means of fire. The mercury colors the molecules of gold entirely, their yellow color disappears, the amalgam is a gray verging on brown if the mercury is saturated.All these effects come from the attraction of gold which is stronger than that of the parts of mercury between them, & which consequently separates them from each other & divides them enough so that they can enter the pores & moisten the substance of gold; for by throwing a piece of this metal into mercury, it will penetrate the whole mass of it over time, and will lose precisely in quantity what the gold will have gained, that is to say, what it will have seized by the amalgam.

Silver also units with mercury by simple contact, but it does not retain it as powerfully as gold, their union is less intimate; & as the color of silver is about the same as that of mercury, its surface only becomes brighter when moistened with it;it is this beautiful brilliant white which has given mercury the name of quicksilver.

This great affinity of mercury with gold and silver would seem to indicate that there must be natural amalgams of these metals in the heart of the earth, however, since minerals are sought and collected, hardly is there an example of amalgamated native gold, and only a few pieces of silver taken from the mines of Germany are known, which contain a considerable enough quantity of mercury to be regarded as true amalgams (m); it is easy to conceive that this rarity of natural amalgams comes from the very rarity of mercury in its flowing state, and it is so to speak only in our hands that it is in this state, instead of in those of Nature, it is in solid mass of cinnabar, & in very different particular places,very distant from those where the primitive gold and silver are found, since it is only in the fissures of the quartz and in the mountains produced by the fire that these metals of first formation lie; while it is in the layers formed by the deposition of the waters that the mercury is found.

Gold & silver are the only materials which amalgamate when cold with mercury; it can only penetrate other metallic substances by means of their fusion by fire, it also amalgamates very well by this same means with gold and silver; the order of ease of these amalgams is gold, silver, tin, lead, bismuth, zinc, & arsenic; but it refuses to unite & amalgamate with iron, as well as with regulus of antimony & cobalt.In these amalgams which are made only by fusion, the mercury must be heated to the degree where it begins to rise in vapours, and at the same time redden in the fire, the powder of the metals which one wishes to amalgamate to triturate it with hot mercury. The metals which like tin & lead, melt before reddening, amalgamate more easily & more quickly than the others; because they mix with the mercury that is projected into their cast iron, & it is only necessary to stir it slightly so that the mercury sticks to all their metallic parts.As for gold, silver & copper, it is only with their powders reddened in the fire that one can amalgamate mercury, because if one pours some on these molten metals, their too strong heat, in this state of fusion, would not only sublimate it into vapors, but would produce dangerous explosions. & it is only necessary to stir it slightly so that the mercury sticks to all their metallic parts. As for gold, silver & copper, it is only with their powders reddened in the fire that one can amalgamate mercury, because if one pours some on these molten metals, their too strong heat, in this state of fusion, would not only sublimate it into vapors, but would produce dangerous explosions. & it is only necessary to stir it slightly so that the mercury sticks to all their metallic parts.As for gold, silver & copper, it is only with their powders reddened in the fire that one can amalgamate mercury, because if one pours some on these molten metals, their too strong heat, in this state of fusion, would not only sublimate it into vapors, but would produce dangerous explosions.

As much as the amalgam of gold & silver is easily made, either hot or cold, as much the amalgam of copper is difficult & slow; the safest & shortest way to make this amalgam is to dip copper strips in the solution of mercury with nitrous acid; the dissolved mercury sticks to the copper & whitens the blades. This union of mercury and copper is only made by means of acid, as that of mercury and sulfur is made by means of alkali.

Mercury can be poured into molten lead without there being an explosion, because the heat which holds lead in fusion is far below that which is necessary to hold gold and silver there; also the amalgam, is made very easily with molten lead; it is the same with tin; but it can also be done cold with these two metals, by reducing them to powder & crushing them for a long time with mercury, it is with this amalgam of lead that the glass jars or vases are fought, in which the animals in the spirit of wine.

The amalgam with tin, is of a very great & very pleasant use for the tinning of mirrors; thus of the six metals there are four, gold, silver, lead and tin, with which mercury amalgamates naturally, either when hot or when cold;it joins with copper only by interlude, finally it absolutely refuses to unite with iron; & we are going to find the same differences in half-metals.

Bismuth & mercury unite when cold by grinding them together; they amalgamate even better when the bismuth is in fusion, & they form quite regular black crystals, & which have little adhesion between them; but this crystallization of bismuth is not an effect which is proper and particular to it; for we have also succeeded in obtaining by mercury a crystallization of all the metals with which it can unite (o).

When mercury is mixed with molten zinc, there is a crackling noise, similar to that of boiling oil in which a cold body is dipped;this amalgam first takes on a sort of solidity, and becomes fluid again by simple trituration; the same effect occurs when mercury is poured into boiling oil, it even takes on a more durable solidity than in molten zinc. Nevertheless, this union of zinc and mercury appears to be a veritable amalgam; for one of our most learned chemists, Mr. Sage, has recognized that it crystallizes like other amalgams. & moreover, the mercury seems to dissolve some portion of the zinc when cold: however this union of the zinc & the mercury seems to be incomplete; because it is necessary to agitate the bath which is always sticky & pasty.

One cannot say either that there is a direct amalgamation and without interlude, between the mercury and the regulus of arsenic even when it was in fusion; finally, mercury cannot amalgamate in any way with antimony and cobalt: thus of all the half-metals, bismuth is the only one with which mercury amalgamates naturally; & who makes it this resistance to unite with these metallic substances, & the facility to amalgamate with others, & particularly with gold & silver, does not come from some common qualities in their fabric, which allows them to moisten themselves with this metallic water, which has so much in common with them by its density.

Be that as it may, we see by these different combinations of mercury with metallic materials, that it really has no very perceptible affinity except with gold and silver, and that it is not for this reason that to say that by force, & by affinities prepared by fire, that it joins with other metals, & that it even unites more easily & more intimately with animal & vegetable substances, than with all mineral matters, except gold & silver.

Moreover, it is not an amalgam, but an ointment formed by mercury mixed by trituration with vegetable oils and animal fats;they act on mercury like the liver of sulfur, they divide it into particles almost infinitely small, & by this extreme division, this dense matter penetrates all the pores of organized bodies, especially those where it is aided by heat, such as in the body of animals on which it produces salutary or fatal effects, depending on whether it is administered. This union of fats with mercury appears even to be more intimate than that of the amalgam which is made cold with gold and silver (p), because two fluids which have some affinity together will always mingle more and more.

Alternate only a solid with a fluid, even if there would be an attraction stronger between them;thus the fats act perhaps more powerfully than these metals on the substance of the mercury, because in becoming rancid they seize the aerial acid, which must act on the mercury; & the proof of this is that it can be removed without any loss of all the amalgams, whereas in melting the fat one does not remove it entirely, especially if the ointment has been kept long enough for the fat to have exerted all its action on mercury(q). which must act on mercury; & the proof of this is that it can be removed without any loss of all the amalgams, whereas in melting the fat one does not remove it entirely, especially if the ointment has been kept long enough for the fat to have exerted all its action on mercury(q). which must act on mercury;& the proof of this is that it can be removed without any loss of all the amalgams, whereas in melting the fat one does not remove it entirely, especially if the ointment has been kept long enough for the fat to have exerted all its action on mercury(q).

Considering now the effects of solvents on mercury, we shall see that acids do not dissolve it equally as they dissolve metals, since the most powerful of all, vitriolic acid, attacks it only by means of a strong heat (r): it is about the same with marine acid; in order for it to unite intimately with mercury, both must be reduced to vapours, and from their combination results one of a very fatal quality, which has been called corrosive sublimate;in this forced state, the mercury does not fail to preserve such a great attraction with itself, that it can overload itself with three quarters of its weight of new mercury(s); & it is thus charging the corrosive sublimate with new mercury, that its corrosive quality be reduced, and that a salutary preparation be made of it, which is called soft mercury, which in fact contains so little sea salt that it is not soluble in water ; we can therefore say that mercury opposes a great resistance to the action of vitriolic acid and marine acid; but nitrous acid dissolves it with as much promptness as energy: when this acid is pure, it has the power to dissolve it without the help of heat;this dissolution produces a white salt which can crystallize, and which is corrosive like that of the dissolution of silver by this acid (t). In this solution the mercury is partly calcined; because after the formation of the crystals, it precipitates in powder of a citrine yellow, which can be regarded as a lime of mercury. Moreover, the nitrous acid which so powerfully dissolves flowing mercury does not attack cinnabar, because the mercury is defended there by the sulfur which surrounds it, and on which this acid has no action.This difference between mercury & sulphur, seems to indicate that as much as sulfur contains fixed fire, so much mercury is deprived of it, & this confirms the idea that the essence of mercury is more related to the element of water. than that of fire.

Of the vegetable acids, that of tartar is the only one which acts sensibly on mercury; the vinegar does not attack it in its flowing state, and units only with its lime; but by triturating the cream of tartar for a long time with the flowing mercury, we manage to unite them by nevertheless adding a little water; one could therefore say that no vegetable acid acts directly and without interlude on mercury.It is the same with the acids which can be drawn from animals; they neither dissolve nor attack the mercury, unless they are mixed with oil or fat, so that all things considered, it does not it is only the aerial acid which acts in the long run through the intermediary of fats on the mercury, and the nitrous acid which dissolves it in a direct manner and without intermediary: for fixed or volatile alkalis have no action on flowing mercury, and can only combine with it when they seize it in vapors or in solutions; they then precipitate it in the form of a powder or lime; but which can always be revived without the addition of carbonaceous or flammable matter; this effect is produced by the rays of the sun alone, in the focus of a burning glass.

A particular proof of the impotence of vegetable or animal acids to dissolve mercury is that the acid of the ants, instead of dissolving its lime, revivifies it, it is only necessary for this to hold them together in digestion (u) . Mercury being by itself neither acid nor alkaline nor saline, does not seem to me to have to be numbered among the solvents, although it attaches itself to the surface and penetrates the pores of gold, silver & pewter; these three metals are the only materials with which it units in its flowing state, and it is less a solution than a moistening; it is only by addition to surfaces, & by juxtaposition, & not by intimate penetration & decomposition of the substance of these metals that it combines with them.

Not only do all alkalis and absorbent earths precipitate mercury from its solutions and cause it to fall into black or gray powder, which takes on a red color over time, but certain metallic substances also precipitate it; copper, tin & antimony do not decompose these solutions; and these precipitates, all revivified, also offer flowing mercury.

One destroys in a way the fluidity of mercury by amalgamating it with metals or by uniting it with fats, one can even give it a semi-solidity by throwing it into boiling oil, there it takes on enough consistency to that it can be handled, extended, & made into rings & other small works; the mercury remains in this state of solidity, There are therefore two circumstances very distant from each other, in which nevertheless the mercury equally takes on solidity, and only regains fluidity by the accession of heat; the first is that of very great cold which only gives it an almost momentary solidity, and which the least degree of diminution of this cold, that is to say, the smallest increase in heat liquefies; the second, on the contrary, is produced only by very great heat, since it takes on this solidity in boiling oil or in molten zinc, and it can then liquefy only by an even greater heat; what direct consequence can be drawn from the comparison of these two same effects in such opposite circumstances, except that mercury participating in the nature of water & that.metal, it freezes, like water by cold, on the one hand; & on the other, consolidates, as does a metal in fusion by the current temperature, resuming its fluidity, like any other metal, only by a strong heat nevertheless this consequence is perhaps not the true one, & it may be that this solidity which mercury acquires in boiling oil & in molten zinc, comes from the sudden change of state that the strong heat causes in its integral parts, & perhaps also from the real combination of the parts oil or zinc which make it a solid amalgam. Be that as it may, no other means of fixing mercury is known; the Alchemists have made vain & immense labors to attain this goal; man cannot transmute substances, nor from a liquid of nature into a solid by art; it belongs only to Nature to change the essences (x), & to convert the elements, & still it is necessary that she be aided by the eternity of time, which, united to her high powers, brings all the possible combinations, and all the forms of which matter can become susceptible.

It is more or less the same with the great researches and the long labors that have been carried out to extract mercury from metals; we have seen that it cannot exist in the primordial mines formed by the primitive fire;therefore it would be absurd to persist in seeking it in primitive gold, silver and copper, since they were produced and melted by this fire; it would seem more reasonable to try to find it in subjects whose training is contemporary with or a little prior to his own; but the idea of this project still vanishes when we see that mercury is not found in any metallic mine, even of second formation, and that the only iron decomposed and reduced to rust, sometimes accompanies it in its mine, However, several Artists, who are not even Alchemists, claim to have drawn mercury from some metallic substances, because we will not speak of the so-called mercury of the so-called Philosophers, which they say is heavier, less volatile, more penetrating, more adherent to the metals than ordinary mercury, and which serves them as a common fluid or solid base; this philosophical mercury is only a being of opinion, a being whose existence is founded only on the rather specious idea, that the fund of all metals is a common matter, an earth that Becher named mercurial earth, and which the other alchemists have regarded as the base of metals. Now it seems to me that by cutting off the excess of these ideas, and examining them without prejudice,they are as well founded as those of some others currently adopted in Chemistry, these beings of opinion of which one makes principles, relates equally to the observation of several common qualities which one would like to explain by the same agent endowed with a property general; now, as metals obviously have several common qualities, it is not unreasonable to seek what can be the active or passive substance which, being equally found in all metals, serves as a general basis for their common properties; one can even give a name to this ideal being in order to be able to talk about it and expand on its supposed properties; that's all we have to allow ourselves, the rest is an excess, a source of error, We presented in the first volume of our Supplements, the great division of the matters which composes the globe of the earth; the first class contains vitreous matter melted by fire; the second, the calcareous materials formed by the waters; the third, topsoil from the detriment of plants and animals; now it does not appear that the metals are expressly included in these three classes; for they were not reduced to glass by the primitive fire; they derive their origin even less from calcareous substances or vegetable earth. They must therefore be considered as forming a class apart, and certainly they are composed of a matter denser than that of all the other substances: but what is this matter so dense? is it solid ground,as their hardness indicates? is it a heavy liquid, as their affinity with mercury also seems to indicate? is it a compound of solid & liquid such as the so-called mercurial earth? or rather isn't it a material similar to other vitreous materials, and which essentially differs only by its density and its volatility? because it can also be reduced to glass. Besides, metals, in their state of primitive nature, are mixed and incorporated into vitreous materials; they alone have the property of giving fixed colors to glass which even fire cannot change;it therefore seems to me that the densest parts of the earthy matter being endowed, relatively to their volume, with a stronger reciprocal attraction, they are, for this reason, separated from the others, & joined together in a smaller volume ; the substance of metals taken in general therefore presents only one goal to our research, which would be to find, if it is possible, the means of increasing the density of the vitreous material, to the point of making a metal of it. , or only to increase that of the metals which are called imperfect, as much as would be necessary to give them the weight of gold;this aim is perhaps placed beyond the limits of the power of our art, but at least it is not absolutely chimerical, since we have already recognized a considerable increase in specific gravity in several metallic alloys. if it is possible, the means of increasing the density of the vitreous matter, to the point of making a metal of it, or only of increasing that of the metals which are called imperfect, as much as would be necessary to give them the weight of gold; this aim is perhaps placed beyond the limits of the power of our art, but at least it is not absolutely chimerical, since we have already recognized a considerable increase in specific gravity in several metallic alloys.if it is possible, the means of increasing the density of the vitreous matter, to the point of making a metal of it, or only of increasing that of the metals which are called imperfect, as much as would be necessary to give them the weight of gold; this aim is perhaps placed beyond the limits of the power of our art, but at least it is not absolutely chimerical, since we have already recognized a considerable increase in specific gravity in several metallic alloys. as much as would be necessary to give them the weight of gold; this aim is perhaps placed beyond the limits of the power of our art, but at least it is not absolutely chimerical, since we have already recognized a considerable increase in specific gravity in several metallic alloys.as much as would be necessary to give them the weight of gold; this aim is perhaps placed beyond the limits of the power of our art, but at least it is not absolutely chimerical, since we have already recognized a considerable increase in specific gravity in several metallic alloys. The chemist Juncker claimed to transmute copper into silver (y), & he collected the processes by which it was desired to extract mercury from metals; I am convinced that it does not exist in any metal of first formation, any more than in any primordial mine, since these metals and mercury could not have been produced together. M. Grosse, of the Academy of Sciences, was mistaken about the lead from which he said he had extracted mercury;for his process has been repeated several times, and always without success, by the most skilful chemists; but although mercury does not exist in the metals produced by the primitive fire, any more than in their primordial mines, it can be found in the metallic mines of the last formation, whether they have been produced by the deposit and the stillation waters, Several famous Authors, & among others Bêcher & Lancelot, have written that they have extracted mercury from antimony; some even advanced that this half-metal was only mercury fixed by an arsenical vapor. M. de Souhey, formerly Consulting Physician to the King, was good enough to communicate to me a process, by which he also claims to have extracted mercury from antimony (z).Other chemists say they have increased the quantity of mercury by treating the corrosive sublimate with antimony cinnabar (a); others, by more combined preparations, claim to have converted some portions of silver into mercury (b); finally others claim to have drawn iron filings from it, as well as lime, copper, & even silver & lead with the help of marine acid ©.

It is by marine acid, and even by the salts which contain it, that mercury is precipitated more abundantly from its solutions, and these precipitates are not in dry powder, but in mucilage or white jelly, which has some consistency. ; it is a kind of mercurial salt, which nevertheless is hardly soluble in water.The other precipitates of mercury by the alkali and by the absorbent earths are in powder of different colors; all these precipitates clash with sulphur: & M. Bayen has recognized that they all retain some portions of the dissolving acid, & of the substances which were used for the precipitation.

We know in medicine the great effects of mercury mixed with fats in which, nevertheless, we would believe it extinguished; it suffices to rub the skin with this mercurial ointment, for this heavy fluid to be seized by intussusception & drawn into all the interior parts of the body which it penetrates intimately, & on which it exerts a violent action, which is particularly to the tassels , & is manifested by salivation;mercury in this state of ointment or union with fat, therefore has a very great affinity with living substances, and its action seems to cease with life; it depends on the one hand on the heat & on the movement of the fluids of the body, & on the other hand on the extreme division of its parts, which, although very heavy in themselves, can, in this state of extreme smallness , to swim with the blood, and even to float there, as the acids float in the solution by forming a film above the dissolving liquor.I do not therefore see that it is necessary to suppose mercury to be in a saline state in order to account for its effects in animate bodies, since its extreme division suffices to produce them, without the addition of any other foreign matter than that of mercury . fat which has divided its parts, and communicated to them its affinity with animal substances; for mercury in flowing mass, and even in cinnabar, applied to the body or taken internally, produces no sensible effect, and only becomes harmful when it is reduced to vapors by fire, or divided into infinitely small particles, by the substances which, like fats,

Notes

(a) The specific gravity of 24 karat gold is 192581, & that of lead 113523. The specific gravity of flowing mercury is 135681, & that of Almaden cinnabar is 102185. See Tables of Mr Brisson.
(b) Idria is a small town located in Carniola, in a very deep valley, on both sides of the Idria river whose name it bears, it is surrounded by high mountains of

limestone, which bears on a shale or black slate, in the layers of which are the workings of the famous mercury mines; the thickness of this schist penetrated with mercury and cinnabar is about twenty fathoms of Idria, and its width or extent is from two to three hundred fathoms;this rich layer of slate varies, either by inclining, or by replacing itself horizontally, often even against the direction. The depth of the principal wells is one hundred and eleven fathoms. See the Description des mimes d'Idria, by M. Ferber, published in 1774.

© Almaden is a town in the province of La Mancha, which is surrounded on the south side by several mountains dependent on the Sierra Morena or black mountain . This village is located at the top of a mountain, on the slope and at the foot of which, on the south side, there are five different openings which lead by underground paths to the places from which the cinnabar is drawn.One does not see beyond this mine either those earths which characterize by some extraordinary color the mineral which one finds in your bosom, nor those rubble which ordinarily render their entry difficult, or which exhale some perceptible odor. .. The laminate is pulled in large massive sections, & it is convicts who are condemned to this work, & who are imprisoned in an enclosure which surrounds one of the shafts of the mine.... The veins which appear at the bottom of the place where the miners work, are of three kinds. The most common is pure rock of a greyish color on the outside, and mixed in its interior with red, white and crystalline shades. This first vein contains a second whose color approaches that of minium. The third is of a compact substance, very heavy, hard and grainy like that of sandstone, and of a dull brick red, sprinkled with an infinity of small silvery brilliants.

Among these three sorts of veins which are the only ones useful, there are various other stones of grayish & slate color, & two sorts of greasy & unctuous, white & gray earth which are rejected. Extract from the Memoir of M. de Jussieu, in those of the Academy of Sciences, year 1719, pages 350 & following.

(d) The town of Almaden, made up of more than three hundred houses, with the church, are built on cinnabar.... The mine is in a mountain, the summit of which is a bare rock on which some small spots can be seen of cinnabar.... along the rest of the mountain there are some small veins of slate with veins of iron, which on the surface follow the direction of the hill...,. Two veins cross the hill in length; they are from two to fourteen feet wide. In certain places branches come out of it which take a different direction... The stone of these veins is the same as that of the rest of the hill which is sandstone similar to that of Fontainebleau; it serves as a matrix for cinnabar which is more or less abundant, depending on whether the grain is more or less fine;some of the pieces of the same vein contain as much as ten ounces of quicksilver per pound, and others contain only three....

The height of this Almaden hill is about one hundred and twenty feet....the huge chunks of sandstone boulders which make up the interior of the mountain, are divided by vertical clefts....Two veins of these rocks more or less provided with cinnabar, cut the hill almost vertically, which, as we have said, are from three to fourteen feet wide; these two veins unite by diverging up to a hundred feet, and it is from there that the richest and the greatest quantity of the mineral has been drawn. Natural History of Spain, by M. Bowles, pages 5 to 29.

(e) Guanca-velica East. a small town of about a hundred families, sixty leagues from Pisco;it is famous for a quicksilver mine, which alone supplies all the gold and silver mills of Peru.... When a sufficient quantity has been drawn, the King closes the mine.

The earth that contains the quicksilver is a whitish red like badly baked brick; it is crushed and put in an earthen furnace whose capital is a half-dome vault, a little spheroid; it is spread on an iron grill covered with earth, under which a small fire is kept up with Icho grass, which is more suitable for this than any other combustible material, and this is why it is forbidden to cut it down. twenty leagues around; the heat of this fire volatilizes the quicksilver into smoke, and by means of a cooler it is made to fall into the water.Frezier, Voyage to the South Sea, pages 164 & 165...

These mines of Guanca-velica are abundant & in great number; but, on all these mines, that which is called of Amador de Cabrera, otherwise of the Saints, is beautiful & remarkable; it is a rock of very hard stone, all strewn with quicksilver, & of such size that it extends to more than eighty vares in length, & forty in breadth, in which mine several wells have been made. & pits seventy furlongs deep.... The Cabrera mine alone is so rich in mercury that its value has been estimated at more than five hundred thousand ducats.It is from this mine of Guanca-velica from which mercury is brought, both in Mexico and in Potozi, to extract silver from the materials which were called scrapings and which were previously rejected as not worth the trouble of being processed by melting. Acosta, Natural & Moral History of the Indies, pages 150 & following. & of such size that it extends to more than eighty vares in length, & forty in breadth, in which mine several shafts & pits of seventy stadia in depth have been made.... The only mine of Cabrera is so rich in mercury that its value has been estimated at more than five hundred thousand ducats.It is from this mine of Guanca-velica from which mercury is brought, both in Mexico and in Potozi, to extract silver from the materials which were called scrapings and which were previously rejected as not worth the trouble of being processed by melting.

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(g) Treatise on the smelting of the mines of Schlutter, volume I, page 7.

(h) Letters from M. l'abbé Belley to M. Hellot. Treatise on the fonts Ois mines of Schlutter, vol. I, page 51.

(i) Treatise on the melting of the mines, &c. volume I, page 68.

(k) The hill on which the city of Montpellier is built, contains flowing mercury as well as the surrounding land; it is found in a yellowish and sometimes gray clay soil.Histoire naturelle du Languedoc, by M. de Gensame, tome I, page 252.—From Mas-de-l'Eglise to Oulargues and even to Colombière, where a large quantity of indications of mercury mines are found , and we are assured that we sometimes see rather large drops of it flowing on the surface of the earth. The quality of the terroir, at the foot of these mountains, consists of whitish slate rocks; they are interspersed with a few beds of very talcose granite. Idem, volume II, page 214.

(l) Letters on Mineralogy, by M. Ferber, page 12.

(m) Natural History of Spain, by M. Bowles,

(n) Two leagues from the city of Alicante.... in a mountain of limestone.... on digging on the side of the valley, a vein of cinnabar was found;but when I saw this vein disappear a hundred feet deep, I suspended the excavation.

In this opening of the rock were found thirteen ounces of fine red sand, which on testing yielded more than one ounce of quicksilver per pound. This fable, by its hardness & its angular figure, quite resembled that of the sea.... On the surface of this mountain & near a bench of flesh-colored plaster, there were sea shells, mineral amber & a vein like a thread , of cinnabar..... I dug at the foot of a mountain near the town of Saint Philippe in Valence, & to the depth of twenty-two, feet, there is a very hard earth, white and calcareous, in which one sees several drops of fluid quicksilver;& having had this earth washed, he brought out twenty-five pounds of virgin mercury.... A little above the place where the mercury is, there are petrifications and plaster. The city of Valencia is traversed by a strip of chalk without petrifications, which, within two feet of its surface, is filled with drops of quicksilver...., Natural History of Spain, by Mr. Bowles, pages 34 & following.

(o) Letters on Mineralogy, by M. Ferber, page 48.

(p) Note. Rzaczynski says, according to Belius, that the part of the Karpacs mountains which faces Poland, contains cinnabar & perhaps gold flakes.... & he says, according to Bruckmann, that the county of Spia also contains cinnabar. M. Guettard, Memoirs of the Academy of Sciences, year 1762, page 318.

(q) Tchacha is probably cinnabar; the best comes from Houquang Province; it is full of mercury, & it is asserted that from a pound of cinnabar one gets half a pound of flowing mercury,... When this cinnabar is left in the air it loses none of its color & it sells for a very high price . Father d'Entrecolles, Edifying Letters, 22, collection, page 358.

(r) The island of Panamao in the Philippines is almost contiguous to that of Leyte...it is mountainous, watered by several streams, & full of sulfur & quicksilver mines. Gemelli Carreri, Journey Around the World; Paris, 1719, volume V, page 119.

(s) General History of Voyages, volume XIII, page 598.

(t) Natural History of the Indies, by Acosta, page 150.

(u) Philosophical & Political History of the two Indies, volume III, page 235.

(x) It is observed that in the cinnabar mines of Almaden, there is no other metal. Memoirs of the Academy of Sciences year 1719, page 350.

(y) Artificial cinnabar is made, similar in all respects to natural cinnabar....-For this, four parts of flowing mercury are mixed with one part of sulfur which has been melted in an unglazed earthen pot; this mixture is stirred and units very easily with the aid of heat;mercury united with sulphur, becomes blackish.... The force of affinity is exerted with so much power between these two matters, that a combination results from it..., This mixture is left to burn for one minute, after whereupon the material is removed, it is pulverized in a marble mortar, and by this trituration it is reduced to a purple powder.... This powder is sublimated by putting it in a matrass over a sand fire which is increased gradually until the bottom of the matrass is very red.The sublimate obtained by this operation is in a needled mass, of a red-brown color, like natural cinnabar when it is not pulverized ..... By this process given by Mr. Baumé, one obtains, in truth, cinnabar, but which is not so fine as that which is made in Holland, where there are large-scale manufactures of artificial cinnabar, but the processes of which are not exactly known. Dictionary of Chemistry, by M. Macquer, article Cinnabar. but whose processes are not exactly known. Dictionary of Chemistry, by M. Macquer, article Cinnabar. but whose processes are not exactly known.

Dictionary of Chemistry, by M. Macquer, article Cinnabar.

(z) One can also make artificial cinnabar by the wet process, by applying, either to mercury alone, or to solutions of mercury by acids, but especially by nitrous acid, the different species of liver of sulfur... & it should be noted that this cinnabar made by the wet process, has a bright red color of fire, infinitely more brilliant than that of the cinnabar which one obtains by sublimation, .. but this difference comes only from the fact that the sublimated cinnabar is more compact in mass than the other, which gives it a red color so dark that it appears darkened; but by grinding it on a porphyry into a very fine powder, it takes on a brilliant bright red.... The one obtained by the wet process, not being in mass like the first, but in fine powder, therefore appears redder for that reason alone. Same,

(a) It is easy to recognize if a stone contains mercury; it is enough to heat it & put it all red under a glass bell jar, because then the smoke which it will exhale is converted into small droplets of flowing mercury.

I have observed, says M. de Jussieu, in the very places of the richest mine, that no flowing mercury is found there, and that if it sometimes appears it is only an effect of the violence of the blows that the miners give on the cinnabar which is made of hard rock, or even more of the heat of the powder which is used to fire these mines. Memoirs of the Academy of Sciences, year 1719, pages 350 & following.

(b) Score. This is exactly true of any cinnabar that contains an earthy base capable of retaining sulphur;however, we must except cinnabar which would only be composed of sulfur and mercury, because it would sublimate rather than decompose; but this cinnabar without an earthy base is hardly found in Nature.

© "According to Mr. Manfredi, it comes from the Lancy valley which is located in the mountains of Tunis, a plant similar to the doronic; one finds near its roots mercury flowing in small globules; its juice expressed in the air on a beautiful night provides as much mercury as the juice has dissipated", Academic collection, foreign part, volume II, page 93.

(d) P. d'Entrecolles reports that in China mercury is obtained from certain plants, and especially from wild purslane, that even this mercury is purer than that obtained from the mines, and that they are distinguishes to China by two different names. Edifying Letters, 22. collection, page 457.

(e) If cinnabar is placed on the fire in closed vessels, it sublimates entirely, without changing its nature. If, on the contrary, it is exposed to the open air & on the same fire, that is to say in open vessels, it decomposes, because the sulfur burns, & then the mercury releases it reduced to vapours. ;but as many are produced in this manner, means have been found to separate it from the sulfur in closed vessels, by offering the sulfur some interlude which has more affinity with it than it has with mercury. ... as fixed alkali, lime, &c. & even metals & demi-metals, especially iron, copper, tin, lead, silver, bismuth & antimony regulus, all of which have more affinity with sulfur than does has mercury, & of all these substances, it is iron which is the most convenient & the most used for the decomposition of cinnabar into small pieces; take two parts of cinnabar & one part of unrusted iron filings; we mix them well together;one puts this mixture in a retort which one places in a furnace with naked fire, or in a capsule, with the bath of sand, arranged so that one can give a rather strong fire; one adds to the retort a container which contains water, and one proceeds to the distillation. The mercury freed from the sulfur by the intermediary of the iron, rises in vapors which pass into the receptacle, and condense there, for the most part, at the bottom of the water in flowing mercury. There is also a portion, mercury which remains very divided & which stops at the surface of the water, because of the fineness of its parts, in the form of a blackish powder, which must be picked up exactly to mix it with the mercury in mass, with which it is easily incorporated.This mercury, which is then passed through a tight cloth, is very pure.... We find in the retort the sulfur of cinnabar united with iron, or alkali, or some other material separate it from the mercury.... Three pounds of cinnabar, according to M. Baumé, give two pounds two ounces of mercury; the iron filings absorb twelve and a half ounces of sulphur, and there is a loss of one and a half ounces. Dictionary of Chemistry, by M. Macquer, article Cinnabar.

(f) Boerhaave subjected eighteen ounces of mercury to five hundred distillations in succession, and after this long test did not notice any perceptible change, except that it seemed to him more fluid, that its specific gravity was a slightly increased & that some grains of fixed matter have remained.Dictionary of Chemistry, pat M, Macquer, article Mercury.

(g) By digestion at a very strong and sustained degree of heat for several months, in a vessel which is not exactly closed, the mercury undergoes a more sensible alteration; its surface changes little by little into a reddish, earthy powder, which no longer has any metallic luster, and which still floats on the surface of the rest of the mercury without being incorporated into it; a given quantity of mercury can thus be converted entirely into red powder, only time and suitable vessels are required. This preparation of mercury is called precipitate per se, and this red powder or precipitate per se can only be obtained by subjecting the mercury to the strongest heat it can withstand without being reduced to vapours. This precipitate appears to be a real lime of mercury..., especially since it was only made by the competition of the air, it does not weigh as much as mercury since it floats on its surface; but its volume or absolute weight is increased by about 1/10... we can release the air to which this increase in weight is due, & reduce this precipitate or this lime without addition in closed vessels, in which mercury revives it; the air which emanates from this mercury lime is very pure (which is very different from the air which emanates from other metallic limes, which is very corrupt), and there is no loss of mercury in this reduction. Dictionary of Chemistry, by M, Macquer, article Mercury.

(h) Having communicated this article to my learned friend M. de Morveau, in whose light I have the greatest confidence, I must confess that he was not of my opinion; here is what he wrote to me about it. “It seems that mercury lime is a real metallic lime, in the sense of the Chemists, Stalhians, that is to say, which lacks the fixed or phlogistic fire; here are three direct proofs among many others;

1.° vitriolic acid becomes sulphurous with and mercury, it acquires this property only by taking phlogiston; he can only take it where there is it; mercury therefore contains phlogiston. The precipitate per se likewise with vitriolic acid does not render it sulphurous; it is therefore deprived of this flammable principle.

2. Nitrous acid formed from nitrous air with all the matters which can supply it with phlogiston; this happens with mercury, not with the precipitate per se; one therefore holds this principle, and the other is deprived of it.

3.° The imperfect metals treated with the fire in closed vessels with the lime of the mercury, calcine while it is being destroyed; thus one receives what the other loses. Before the operation, the imperfect metal could furnish the nitre with the phlogiston necessary for its deflagration; he can no longer do so after the operation; Isn’t it obvious that he was deprived of it during this operation?I agree with M. de Morveau on all these facts, and I will also agree on the conclusion he draws from them, provided that it is not made general. I am far from denying that mercury does not contain fixed fire and fixed air, since all metallic or earthy materials contain them; but I still think that an explanation where only one of these two elements is used, is simpler than all the others where two people are used; & this is the case of mercury lime, whose formation & reduction are very clearly explained by the union & separation of air, without it being necessary to resort to phlogiston;& we believe to have very sufficiently demonstrated that the accession or its recession of fixed air would fully suffice to operate & explain all the phenomena of the formation & reduction of metallic limes. without it being necessary to resort to phlogiston; & we believe to have very sufficiently demonstrated that the accession or its recession of fixed air would fully suffice to operate & explain all the phenomena of the formation & reduction of metallic limes. without it being necessary to resort to phlogiston; & we believe to have very sufficiently demonstrated that the accession or its recession of fixed air would fully suffice to operate & explain all the phenomena of the formation & reduction of metallic limes.

(i) The mineral ethiops is a combination of mercury with a fairly large amount of sulphur; it is black.... It does so either by fusion or by simple trituration.... Sulfur is melted in an unglazed earth vessel; as soon as it is melted, an equal quantity of mercury is mixed into it, removing the vessel from the fire. The mixture is stirred until it is cooled & congealed; there remains after that a black and friable mass which is ground and sieved, and it is ethiops.

And when one wants to make ethiops without fire, one triturates the mercury with the sulfur in a glass or marble mortar, by putting two parts of mercury on three parts of flowers of sulfur, & one triturates until let the mercury no longer be visible. ... The union of mercury and sulfur in ethiops is not so strong as in cinnabar; it should not be believed for that that it is null, and that there is in ethiops only a simple mixture or interposition of the parts of the two substances; there is actual grip & combination. The proof of this is that they can only be separated by interludes which are the same as those used to separate mercury from cinnabar, and this ethiops can easily become, being treated by chemical processes, real artificial cinnabar.Dictionary of Chemistry, by M. Macquer, Ethiops article. (k) If we put, says M. de Morveau, in balance a balance carrying in one of its arms a piece of ice cut in a circle, two and a half inches in diameter, suspended in a horizontal position, by a hook masticated on the upper surface, & if this ice is then lowered onto the surface of the mercury placed below, at a very short distance, it will be necessary to add in the opposite basin up to nine large eighteen grains, to detach the ice from the mercury & overcome the adhesion resulting from the contact.

The weight and the compression of the atmosphere have nothing to do with this phenomenon, because the apparatus being placed on the container devoid of air, of the pneumatic machine, the mercury still adhered to the ice, with an equal force, & this adhesion will likewise support the nine large ones with which the other arm of the balance will have previously been charged. Elements of Chemistry, by M. de

Morveau, volume I, pages 54 & 55

(l) M. de Machi.

(m) Mr. Sage mentions a piece of gold native to Hungary, of a grayish yellow, fragile, & in which the analysis made him find a small quantity of mercury, with which one can believe that this gold had been naturally amalgamated. This piece containing only very little mercury, must certainly be ranked among the gold mines;but the native silver amalgams of Sahlberg & the Palatinate often contain more mercury than silver; they should therefore be reported among the mercury mines. Letters from M. Demeste, volume II, page 109.

(n) 1.° Equal parts of mercury & lead form a solid white mass, from which part of the mercury is separated by an exudation caused by the heat of the atmosphere alone , into infinitely small globules.

2.° Two parts of lead & one of mercury form a white, hard, brittle mass, with small grains like those of steel, from which the mercury does not escape; these two substances then form a lasting combination.

3.° Three parts of lead & one of mercury form a more ductile mass than lead & tin;it can be made into vases, and it is easily drawn from the spinneret. 4.° This last mixture is of an extraordinary fusibility; but if it is first exposed to a great fire, it explodes with an explosion; if, on the contrary, it is liquefied at a good heat, it can then be heated red hot; but it continually boils with a rustle like grease.

5.° If we continue to hold it in fusion,

6. The filth which forms on the surface of lead combined with mercury, exposed alone in a vessel red with fire, decrepitates like sea salt.

7.° This amalgam of mercury & lead combines with gold, silver, copper rosette, brass, regulus of antimony, zinc & bismuth;it sours them all, except tin with which it produces a rather beautiful mixed metal, white & ductile. Note communicated by M. Grignon, in October 1782.

(o) See on this the experiments of M. Sage.

(p) The mercury must not be regarded as simply distributed & intermixed with the parts of the fat in the mercurial ointment; it is very certain, on the contrary, that there is adhesion & combination, even very intimate, of at least a portion of the mercury with the fat.... the flux, remove all the mercury that had been put in it. Dictionary of Chemistry, by M. Macquer, article Mercury.

(q) Although mercury is capable of dividing when triturated with a fatty oil, there does not appear to be any real dissolution.... Mercury combines more easily with animal fats which are not however only a species of oil in which the acid is more abundant, and which moreover manifests the same affinities as the other oily substances. We must not, however, attribute the action of these fats on mercury to the phosphoric acid which they contain.

It is by combining the fat with the mercury that the mercurial ointment is formed... In this ointment, the parts of mercury do not appear to be simply distributed or intermingled with the parts of the fat;one is justified in thinking on the contrary that there is adhesion & union, even very intimate, because this grease of the mercurial ointment becomes rancid very quickly, as it happens to all the oily matters which enter into any combination.... (r) Vitriolic acid in its ordinary state does not act, or acts only very weakly and very badly, on bulk mercury . These two substances cannot combine together unless the acid is in the greatest degree of concentration, & seconded by the strongest heat.... When this acid is well concentrated, it reduces the mercury to a mass white-colored saline, called mercury vitriol. If we expose to the action of fire the combination of vitriolic acid with mercury, the greater part of this acid is detached from it; When the mercurial ointment is old, if it is rubbed between two gray papers, the grease soaks into the paper, and no mercury globules are seen; it is not the same when this ointment is recent, one very easily discovers there a large quantity of metallic parts. All these observations prove that there is a combination, an intimate union in this mixture, when it is old. Elements of Chemistry, by M. de Morveau, volume III, pages 389 & following.

but a very remarkable thing is that mercury thus treated with vitriolic acid sustains a greater heat and consequently appears a little more fixed than when it is pure. This fixity is a consequence of its lime state. Dictionary of Chemistry, by M. Macquer, article Mercury.

(s) The marine acid in liquor does not act perceptibly on the mercury in mass, even when it is aided by the heat of boiling; but when this very concentrated acid is reduced to vapours, and it meets the mercury also reduced to vapours, then they unite in a very intimate way. The result is a sea salt, mercurial crystallized in flattened needles, & which has been called corrosive sublimate, because it is only obtained by sublimation.... The affinity of marine acid with mercury is so great that it becomes overloaded, in a way , of a considerable quantity of this metallic matter.... The corrosive sublimate can absorb & take charge little by little, by trituration, of three quarters of its weight, of new mercury. Dictionary of Chemistry, by M. Macquer,

(t) Nitrous acid dissolves mercury very well; six ounces of good acid suffice to complete the solution of eight ounces of this metal; it attacks it even when cold, & produces effervescence & heat,... The solution is first colored blue, by the union of the flammable principle; it forms there by cooling, a neutral salt, not deliquescent, arranged in needles; it is the mercurial nitre.... M. Baumé remarks that the solution of mercurial nitre, cooled on the sand bath, gave perpendicular needles, and that cooled far from the fire, it gave horizontal needles. Elements of Chemistry, by M, de Morveau, volume II, pages 179 & following.

(u) Elements of Chemistry, by M. de Morveau, volume II, page 15.

(x) Note.I cannot place complete confidence in what is reported in the Chemical Recreations, by M. Parmentier, volume I, pages 339 & following, it is nevertheless what we have most authentic on the transmutation of metals; it gives a process for converting mercury into gold, resistant to any test, and this, by means of the acid of tartar; this process, which is from Constantine, was repeated by Mayer & verified by M. Parmentier, who is careful to state that it is not made to enrich. (y) Here is his process; one makes pour in mass with the fire of sand, four parts of sheets of copper, four parts of corrosive sublimate, & two parts of sal ammonia; this compound is pulverized and washed in vinegar until the new vinegar no longer turns green;we then melt what remains with a part of silver, & we cut with the lead; according to Juncker, copper is converted into silver. M. Weber, a German chemist, has just repeated this process twice, on the assurance that two people had given him that he had succeeded; he admits that he only found the silver added to the fusion, & he remarks, with all reason, that it is operating quite successfully & with all accuracy, when a portion of the fine metal does not pass through the chimney with the expectation of transmutation . Physico-chemical magazine of M. Weber, volume II page 121.

(z) “Mercury, says M. de Souhey, is an aqueous & earthy mixture, in which there enters a portion of the flammable or sulphurous principle, & which is charged to the excess of Becher’s third earth; this, he says, is the best definition one can give of mercury. It seemed to me so avid of the principle continuing metals & semi-metals, that I managed to precipitate these with ordinary mercury in a form of reducible lime, without addition, with the aid of water & with that of fire; I have thus calcined all metals, even the most perfect, in such an irreducible manner with mercury drawn from half-metals. The affinity of mercury is so great with metals and semi-metals, that one could, so to speak,ensure that mercury is to the mineral kingdom what water is to the other two kingdoms. To prove this assertion, I made tests on the half-metals, and I expose here only the process made on the regulates of antimony; by melting a part of this regulus with two parts of silver (which serves here as an interlude, and which we separate, the finished operation), we will reduce this material to powder which we will amalgamate with five or six parts of mercury; the mixture will be triturated with fountain water, for twelve to fifteen hours, until it is very white; the amalgam will be brown for a long time, & by repeated lotions, the water will gradually drag it down with it in a form of entirely fusible black lime; this carefully collected lime,dried & set on fire in a retort, we separate the mercury which was mixed in it; by decanting the water which was used to clean the amalgam, one will find only two thirds of the weight of the regulus which had been melted & then amalgamated with if the mercury; one also separates by sublimation the one who had remained with the silver; then, if the operation has been well done, the silver will be free from all alloy, and very white; the mercury will have sensibly increased in weight, taking into account that which was mixed with the lime of the regulus which is supposed to have been separated by distillation.We can conclude that the mercury has appropriated the third of the weight which is missing on the totality of the regulus, and that this third has been reduced to mercury, no longer being able to separate itself from it; the remaining two-thirds If the water which has been used for the lotions is evaporated to dryness, and after having left it to settle, there will remain a greyish earth having a saline taste, and reddening a little in the fire; this earth belonged to the mercury which deposited it in the water which held it in solution.

Mercury, in the above operation, performs the function of fire, and produces the same effects;he made the antimony regulus disappear from its shiny appearance, he made it lose part of its weight by calcining it in an irreducible way, without addition, with the help of water and trituration, as completely as this what could fire do.

Note. One can notice in this exposition of M. de Souhey, that his idea on the essence of mercury, which he regards as a metallic water, agrees with mine; but I will observe that it is not surprising that metals treated with mercury are calcined even by simple trituration; we know that the fixed metal retains a little mercury in the distillation fire, we also cause the mercury to carry off a little of the fixed metals when distilled;thus, as long as one has not purified the mercury which one believes to have increased by the mercury of antimony, this fact will not be demonstrated.

(a) Here is an example or two of mercurification, taken from Vallerius & Teichmeyer. If we distil cinnabar of antimony made by the corrosive sublime, we will always withdraw from the distillations after the revivification of the mercury, more mercury than there was in the corrosive sublime. Dictionary of Chemistry, by M. Macquer, article Mercury.

(b) If one prepares a corrosive sublimate with the spirit of salt & flowing mercury, & one sublimates lime or silver filings several times with this sublimate, part of the silver will change to mercury. Dictionary of Chemistry, by M. Macquer, article Mercury.

© The very fine iron filings exposed for one year to the fiber air, then well crushed in a mortar.... put back after that for another year in the air, & finally subjected to distillation in a retort, provides a hard material which attaches to the neck of the Vaisseau, & with this material a little mercury.

If we take ash or copper lime, mix it with sal ammonia, expose this mixture for a certain time to the air, and put it in distillation with soap, we will get mercury. It is also claimed to extract mercury from lead and horny silver, by mixing it with equal parts of well-concentrated spirit of salt, leaving them in digestion for three or four weeks, and then saturating this mixture with alkali. volatile, & putting it back into digestion for three or four weeks, at the end of this time it is necessary to add an equal quantity of black flux & Venetian soap, & put the whole thing in distillation in a glass retort, it will pass mercury in the container. Same, same.

QUOTE OF THE DAY

“The Body therefore does tinge the Spirit, and the Spirit does penetrate the Body, whereas one Body cannot penetrate another Body, but a

> subtle Spiritual congealed Substance does penetrate and give Colour to the Body.”
>
> **Bernard Trevisan**
>
> Treatise of the Philosophers Stone

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